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FILE 'HOME' ENTERED AT 09:58:06 ON 08 MAY 2003

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COST IN U.S. DOLLARS                                    SINCE FILE      TOTAL
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FULL ESTIMATED COST                                         0.21       0.21

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E2            1     E.C. 4.1.2.10/CN
E3            1 --> E.C. 4.1.2.11/CN
E4            1     E.C. 4.1.2.12/CN
E5            1     E.C. 4.1.2.13/CN
E6            1     E.C. 4.1.2.14/CN
E7            1     E.C. 4.1.2.15/CN
E8            1     E.C. 4.1.2.16/CN
E9            1     E.C. 4.1.2.17/CN
E10           1     E.C. 4.1.2.18/CN
E11           1     E.C. 4.1.2.19/CN
E12           1     E.C. 4.1.2.2/CN

=> s e3
L1            1 "E.C. 4.1.2.11"/CN

=> d

L1   ANSWER 1 OF 1  REGISTRY  COPYRIGHT 2003 ACS
RN   9075-38-1  REGISTRY
CN   Lyase, hydroxymandelonitrile (9CI)  (CA INDEX NAME)
OTHER NAMES:
CN   (S)-p-Hydroxymandelonitrile lyase
CN     ***E.C. 4.1.2.11***
CN   Hydroxynitrile lyase
CN   S-Hydroxynitrilase
CN   S-Hydroxynitrile lyase
CN   S-Oxynitrilase
MF   Unspecified
CI   MAN
LC   STN Files:   AGRICOLA, BIOBUSINESS, BIOSIS, CA, CAPLUS, CASREACT, CEN,
       CHEMINFORMRX, CIN, PROMT, TOXCENTER, USPATFULL

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
               68 REFERENCES IN FILE CA (1957 TO DATE)
                2 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
               68 REFERENCES IN FILE CAPLUS (1957 TO DATE)


=> set expand cont
SET COMMAND COMPLETED

=> sel l1 name
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E13 THROUGH E18 ASSIGNED

=> index bioscience
FILE 'DRUGMONOG' ACCESS NOT AUTHORIZED
COST IN U.S. DOLLARS                                SINCE FILE      TOTAL
                                                       ENTRY    SESSION
FULL ESTIMATED COST                                     6.99       7.20

INDEX 'ADISCTI, ADISINSIGHT, ADISNEWS, AGRICOLA, ANABSTR, AQUASCI, BIOBUSINESS,
       BIOCOMMERCE, BIOSIS, BIOTECHABS, BIOTECHDS, BIOTECHNO, CABA, CANCERLIT,
       CAPLUS, CEABA-VTB, CEN, CIN, CONFSCI, CROPB, CROPU, DDFB, DDFU, DGENE,
       DRUGB, DRUGLAUNCH, DRUGMONOG2, ...' ENTERED AT 09:59:31 ON 08 MAY 2003

66 FILES IN THE FILE LIST IN STNINDEX

Enter SET DETAIL ON to see search term postings or to view
search error messages that display as 0* with SET DETAIL OFF.

=> s e13-18 and immobil?
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          1   FILE BIOBUSINESS
          7   FILE BIOSIS
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          9   FILE BIOTECHABS
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          4   FILE BIOTECHNO
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          7   FILE SCISEARCH
  59 FILES SEARCHED...
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  61 FILES SEARCHED...
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          5   FILE WPIDS
  65 FILES SEARCHED...
          5   FILE WPINDEX

  22 FILES HAVE ONE OR MORE ANSWERS,   66 FILES SEARCHED IN STNINDEX

L2   QUE ("(S)-P-HYDROXYMANDELONITRILE LYASE"/BI OR "E.C. 4.1.2.11"/BI OR "HYDR
         OXYNITRILE LYASE"/BI OR S-HYDROXYNITRILASE/BI OR "S-HYDROXYNITRILE LYA
         SE"/BI OR S-OXYNITRILASE/BI) AND IMMOBIL?
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          5   FILE BIOSIS
          6   FILE BIOTECHABS
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          6   FILE BIOTECHDS
          3   FILE BIOTECHNO
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          2   FILE CABA
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          7   FILE IFIPAT
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          4   FILE PASCAL
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  57 FILES SEARCHED...
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  60 FILES SEARCHED...
         13   FILE USPATFULL
  61 FILES SEARCHED...
          2   FILE WPIDS
  65 FILES SEARCHED...
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  20 FILES HAVE ONE OR MORE ANSWERS,   66 FILES SEARCHED IN STNINDEX

L3   QUE L2 AND PY<2000

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F1          13   USPATFULL
F2          12   CAPLUS
F3           7   IFIPAT
F4           6   BIOTECHABS
F5           6   BIOTECHDS
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F6	5	BIOSIS
F7	5	SCISEARCH
F8	4	PASCAL
F9	3	AGRICOLA
F10	3	BIOTECHNO
F11	2	CABA
F12	2	CEN
F13	2	EMBASE
F14	2	WPIDS
F15	2	WPINDEX
F16	1	BIOBUSINESS
F17	1	CEABA-VTB
F18	1	ESBIOBASE
F19	1	MEDLINE
F20	1	TOXCENTER

=> file f2-20

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	15.40	22.60

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   6 FILES SEARCHED...
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  12 FILES SEARCHED...
  14 FILES SEARCHED...
  15 FILES SEARCHED...
L4   58 L3

=> dup rem l4
PROCESSING COMPLETED FOR L4
L5   26 DUP REM L4 (32 DUPLICATES REMOVED)
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                 ANSWERS '13-17' FROM FILE IFIPAT
                 ANSWERS '18-22' FROM FILE BIOTECHDS
                 ANSWER '23' FROM FILE SCISEARCH
                 ANSWERS '24-25' FROM FILE CEN
                 ANSWER '26' FROM FILE WPIDS

=> d bib abs 1-12 18-23 26

L5   ANSWER 1 OF 26 CAPLUS COPYRIGHT 2003 ACS   DUPLICATE 1
AN   1998:533933 CAPLUS
DN   129:272310
TI   Biocatalysis in microstructured lyotropic liquid crystals
AU   Boy, M.; Voss, H.
CS   Institute of Biotechnology, SFB Biocatalysis, Graz University of
     Technology, Graz, A-8010, Austria
SO   Journal of Molecular Catalysis B: Enzymatic (***1998***), 5(1-4),
     355-359
     CODEN: JMCEF8; ISSN: 1381-1177
PB   Elsevier Science B.V.
DT   Journal

LA English
AB Biphasic liq. crystal systems consisting of org. solvent, water and surfactant are interesting media for biocatalysis in a non-aq. environment. The application of such systems for the (***S***)-***hydroxynitrile*** ***lyase*** catalyzed synthesis of (S)-mandelonitrile is demonstrated. Screening a favorable liq. crystal system is the first step. Exptl. of the influence of temp., enzyme and substrate concn. on the kinetics are presented. Interactions of the three-dimensional liq. cryst. ***immobilization*** matrix and the mass transfer and biochem. reaction kinetics are shown.
RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 2 OF 26 CAPLUS COPYRIGHT 2003 ACS DUPLICATE 2
AN 1998:691672 CAPLUS
DN 130:135818
TI Expression of the Zn2+-containing ***hydroxynitrile*** ***lyase*** from flax (Linum usitatissimum) in Pichia pastoris- utilization of the recombinant enzyme for enzymic analysis and site-directed mutagenesis
AU Trummler, Klaus; Roos, Jurgen; Schwaneberg, Ulrich; Effenberger, Franz; Forster, Siegfried; Pfizenmaier, Klaus; Wajant, Harald
CS Institute of Cell Biology and Immunology, University of Stuttgart, Stuttgart, 70569, Germany
SO Plant Science (Shannon, Ireland) (***1998***), 139(1), 19-27
CODEN: PLSCE4; ISSN: 0168-9452
PB Elsevier Science Ireland Ltd.
DT Journal
LA English
AB ***Hydroxynitrile*** ***lyases*** (HNL) are involved in the catabolism of cyanogenic glycosides in cyanogenic plants and are powerful tools in the stereoselective synthesis of cyanohydrins. The recent cloning of the ***hydroxynitrile*** ***lyase*** from flax (Linum usitatissimum; LuHNL) reveals that this enzyme defines a novel class of HNL. Thorough biochem. and mutational anal. of LuHNL have been hampered by low expression levels of the recombinant enzyme in Escherichia coli. To overcome this impediment, we have cloned a myc-His-tagged LuHNL-cDNA under control of the methanol-inducible AOX1 (alc. oxidase) promoter of Pichia pastoris and introduced it in the SMD1168 strain. Recombinant LuHNL was kinetically indistinguishable from the authentic flax enzyme. ***Immobilized*** LuHNL was used for synthesis of several aliph. (R)-cyanohydrins in a preparative scale to analyze the products according to enantiomeric excess and yield of reaction. LuHNL has significant homologies to members of the Zn2+-contg. alc. dehydrogenases (Zn2+-ADHs). In particular, residues responsible for coordination of Zn2+ ions or fulfilling structural or functional tasks in Zn2+-ADHs are conserved. We found about 2-4 mol zinc per mol of recombinant LuHNL using atom absorption spectroscopy in a non His-tagged version of LuHNL. Using site-directed mutagenesis, we substituted several of the conserved residues against alanine in LuHNL and found that in most cases, HNL-activity was impaired. Hence, it seems that LuHNL and Zn2+-ADHs have similar structural requirements with respect to maintaining a catalytically active structure. Residues essentially involved in catalysis of Zn2+-ADHs are also of functional importance in LuHNL, suggesting that the removal of the proton from alc. and cleavage of cyanohydrins can be fulfilled by similar active site structures.
RE.CNT 23 THERE ARE 23 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 3 OF 26 CAPLUS COPYRIGHT 2003 ACS DUPLICATE 3
AN 1997:591161 CAPLUS
DN 127:175496
TI Production of (S)-cyanohydrins
IN Effenberger, Franz; Wajant, Harald; Foerster, Siegfried; Roos, Juergen
PA Degussa Ag, Germany
SO Ger. Offen., 11 pp.
CODEN: GWXXBX
DT Patent
LA German
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 19703314	A1	19970814	DE 1997-19703314	19970130 <--
	EP 799894	A2	19971008	EP 1997-101401	19970130 <--
	EP 799894	A3	19991208		
	R: AT, BE, CH, DE, DK, FR, GB, LI, NL				
	JP 09227488	A2	19970902	JP 1997-23666	19970206 <--
	US 5885809	A	19990323	US 1997-796873	19970207 <--
PRAI	DE 1996-19604715		19960209		

OS MARPAT 127:175496
AB (S)-Cyanohydrins are produced in isomeric excess from the corresponding carbonyl compds. by reaction with HCN or a CN- salt catalyzed by (***S***)- ***oxynitrilase*** (EC 4.1.2.37) ***immobilized*** on nitrocellulose.

L5 ANSWER 4 OF 26 CAPLUS COPYRIGHT 2003 ACS DUPLICATE 4
AN 1995:1004311 CAPLUS
DN 124:80260
TI Purification and characterization of a novel (R)-mandelonitrile lyase from the fern Phlebodium aureum
AU Wajant, Harald; Foerster, Siegfried; Selmar, Dirk; Effenberger, Franz; Pfizenmaier, Klaus
CS Institut fuer Zellbiologie Immunologie, Universitaet Stuttgart, Stuttgart, 70569, Germany
SO Plant Physiology (***1995***), 109(4), 1231-38
CODEN: PLPHAY; ISSN: 0032-0889
PB American Society of Plant Physiologists
DT Journal
LA English
AB Using high-performance liq. chromatog. and NMR we identified vicianin as the cryogenic compd. of Phlebodium aureum. The (R)- ***hydroxynitrile*** ***lyase*** involved during cyanogenesis in the catabolism of the aglycon ([R]-mandelonitrile) was purified to apparent homogeneity. The purified holoenzyme is a homomultimer with subunits of Mr = 20,000. At least three isoforms of the enzyme exist. In contrast to other ***hydroxynitrile*** ***lyases*** , mandelonitrile lyase (MDL) from P. aureum was not inhibited by sulfhydryl- or hydroxyl-modifying reagents, suggesting a different catalytic mechanism. The enzyme is active over a broad temp. range, with max. activity between 35 and 50.degree. and a pH optimum at 6.5. In contrast to (R)-MDLs isolated from several species of the Rosaceae family, (R)-MDL from P. aureum is not a flavoprotein. The substrate specificity was investigated using ***immobilized*** enzyme and diisopropyl ether as solvent. The addn. of cyanide to arom. and heterocyclic carbonyls is catalyzed by this (R)-MDL, whereas aliph. carbonyls are poorly converted.

L5 ANSWER 5 OF 26 CAPLUS COPYRIGHT 2003 ACS DUPLICATE 5
AN 1993:254558 CAPLUS
DN 118:254558
TI Process for preparing optically active cyanohydrins with enzymes
IN Andruski, Stephen W.; Goldberg, Bruce
PA FMC Corp., USA
SO U.S., 7 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5177242	A	19930105	US 1991-809803	19911217 <--
	CA 2093826	AA	19930618	CA 1992-2093826	19921113 <--
	CA 2093826	C	19950829		
	WO 9312072	A1	19930624	WO 1992-US9945	19921113 <--
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	RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG				
	AU 9331414	A1	19930719	AU 1993-31414	19921113 <--
	AU 647982	B2	19940331		
	JP 05507736	T2	19931104	JP 1993-508002	19921113 <--
	EP 590096	A1	19940406	EP 1992-925308	19921113 <--
	EP 590096	B1	19960306		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, SE				
	BR 9205413	A	19940531	BR 1992-5413	19921113 <--
	HU 71308	A2	19951128	HU 1993-1020	19921113 <--
	CZ 280422	B6	19960117	CZ 1993-651	19921113 <--
	AT 135047	E	19960315	AT 1992-925308	19921113 <--
	PL 170490	B1	19961231	PL 1992-300043	19921113 <--
	RU 2092558	C1	19971010	RU 1993-33481	19921113 <--
	RO 112765	B1	19971230	RO 1993-489	19921113 <--
	CN 1075166	A	19930811	CN 1992-114106	19921202 <--
	NO 9301316	A	19930816	NO 1993-1316	19930406 <--
	KR 9709155	B1	19970607	KR 1993-71172	19930420 <--
PRAI	US 1991-809803	A	19911217		
	WO 1992-US9945	A	19921113		

OS CASREACT 118:254558; MARPAT 118:254558
AB Title compds. esp. (S)-cyanohydrins, useful as intermediates in prepn. of known pyrethroid insecticides, are prepd. by an improved process comprising reacting aldehydes with HCN in presence of the catalytic enzyme ***S*** - ***oxynitrilase*** chem. bound to a porous membrane. ***Immobilized*** ***S*** - ***oxynitrilase*** and Bu2O contg. 3-(PhO)C6H4CHO and HCN were reacted at 6.degree. to give the title compds. (S)-3-(PhO)C6H4CH(NC)OH and its R-isomer is in a ratio of 96/4. The above process does not only increase the selectivity of S- to R-isomers, but also shorten the reaction time.

L5 ANSWER 6 OF 26 CAPLUS COPYRIGHT 2003 ACS DUPLICATE 6
AN 1992:189955 CAPLUS
DN 116:189955
TI Purification and protein characterization of ***hydroxynitrile*** ***lyases*** from sorghum and almond
AU Jansen, I.; Woker, R.; Kula, M. R.

CS Inst. Enzymtechnol., Heinrich-Heine-Univ. Duesseldorf, Juelich, D-5170, Germany
SO Biotechnology and Applied Biochemistry (***1992***), 15(1), 90-9
CODEN: BABIEC; ISSN: 0885-4513
DT Journal
LA English
AB ***Hydroxynitrile*** ***lyase*** of Sorghum bicolor (EC 4.1.2.11) was purified by a new procedure using (NH4)2SO4 pptn. and ***immobilized*** metal ion affinity chromatog. as key steps. The protein was characterized according to mol. wt., subunit compn., pI, pH, and temp. stability and was compared with ***hydroxynitrile*** ***lyase*** of almond (EC 4.1.2.10). Furthermore, the N-terminal sequences of the oxynitrilases are reported.

L5 ANSWER 7 OF 26 CAPLUS COPYRIGHT 2003 ACS DUPLICATE 7
AN 1993:228768 CAPLUS
DN 118:228768
TI Purification of ***S*** - ***oxynitrilase*** from Sorghum bicolor by ***immobilized*** metal ion affinity chromatography on different carrier materials
AU Woker, R.; Champluvier, B.; Kula, M. R.
CS Inst. Enzymetechnol., Heinrich-Heine-Univ. Duesseldorf, Juelich, D-5170, Germany
SO Journal of Chromatography, Biomedical Applications (***1992***), 584(1), 85-92
CODEN: JCBADL; ISSN: 0378-4347
DT Journal
LA English
AB The purifn. of ***hydroxynitrile*** ***lyase*** (EC 4.1.2.11, ***S*** - ***oxynitrilase***) from S. bicolor is compared using different strategies. A new procedure is presented, which exploits the affinity of ***S*** - ***oxynitrilase*** towards metal ions as a key step in purifn. The metal ions are ***immobilized*** by chelators on different carrier materials, e.g. Sepharose beads, microporous membranes or poly(ethylene glycol). A systematic examn. demonstrates the excellent potential of ***immobilized*** metal affinity chromatog. as a preparative sepn. method.

L5 ANSWER 8 OF 26 CAPLUS COPYRIGHT 2003 ACS DUPLICATE 8
AN 1990:215459 CAPLUS
DN 112:215459
TI One carbon homologation of carbohydrates by two-phase transcyanohydrination
IN Arena, Blaise J.
PA Allied-Signal, Inc., USA
SO U.S., 9 pp. Cont.-in-part of U.S. Ser. No. 810,627, abandoned.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4900667	A	19900213	US 1987-73259	19870713 <--
PRAI	US 1985-810627		19851219		

AB A method for manufg. L-sugars for use in artificial sweeteners by homologating monosaccharides via their cyanohydrins uses

transcyanohydrination across a phase boundary from a water-insol. donor cyanohydrin dissolved in a water-immiscible org. solvent to an aq. soln. of a receptor monosaccharide. This heterogeneous transcyanohydrination can be incorporated into a cyclic process where the cyanide donor is enzymically regenerated via enzyme catalyzed addn. of HCN to a suitable aldehyde. The latter process can be made continuous or semicontinuous by ***immobilization*** of the enzyme. The donor cyanohydrin mandelonitrile (I) was prepd. enzymically from NaCNand benzaldehyde. I in chloroform was used to homologate L-arabinose to a mixt. of L-glucocyanohydrin and L-mannocyanohydrin with a conversion rate of 70%. By using 5-fold excess of I and proper agitation, a conversion rate of 90% is ensured. Furthermore, most of the cyanide dissocd. from the mandelonitrile did notenter the aq. phase.

L5 ANSWER 9 OF 26 CAPLUS COPYRIGHT 2003 ACS
AN 1998:493698 CAPLUS
DN 129:135261
TI Enzymic processes for preparing (S)-cyanohydrins
IN Kirchner, Gerald; Wirth, Irma; Werenka, Christian; Griengl, Herfried; Schmidt, Michael
PA DSM Chemie Linz G.m.b.H., Austria; Kirchner, Gerald; Wirth, Irma; Werenka, Christian; Griengl, Herfried; Schmidt, Michael
SO PCT Int. Appl., 38 pp.
CODEN: PIXXD2
DT Patent
LA German
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
PI	WO 9830711	A1	19980716	WO 1997-EP2692	19970526	<--
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	RW: GH, KE, LS, MW, SD, SZ, UG, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG					
	AT 9700041	A	20000315	AT 1997-41	19970113	
	AT 406959	B	20001127			
	AU 9731674	A1	19980803	AU 1997-31674	19970526	<--
	EP 951561	A1	19991027	EP 1997-927041	19970526	<--
	EP 951561	B1	20010808			
	R: AT, BE, CH, DE, DK, ES, FR, GB, IT, LI, NL, IE					
	AT 204023	E	20010815	AT 1997-927041	19970526	
	JP 2001513625	T2	20010904	JP 1998-530486	19970526	
	ES 2161466	T3	20011201	ES 1997-927041	19970526	
	US 6337196	B1	20020108	US 1999-331761	19990625	
PRAI	AT 1997-41	A	19970113			
	WO 1997-EP2692	W	19970526			

OS MARPAT 129:135261
AB The invention concerns an enantioselective process for prepg. the (S)-enantiomer of an optically active cyanohydrin by reacting an aldehyde or ketone with a cyanide group donor. According to this process, the aldehyde or ketone is reacted with a cyanide group donor in an org. diluent in the presence of a recombinant (***S***)-***hydroxynitrile*** ***lyase*** from Hevea brasiliensis, the resultant (S)-cyanohydrin being isolated from the reaction mixt.
RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD

ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 10 OF 26 CAPLUS COPYRIGHT 2003 ACS
AN 1996:154053 CAPLUS
DN 124:224570
TI The first recombinant ***hydroxynitrile*** ***lyase*** and its application in the synthesis of (S)-cyanohydrins
AU Foerster, Siegfried; Roos, Juergen; Effenberger, Franz; Wajant, Harald; Sprauer, Achim
CS Inst. Org. Chemie Univ., Stuttgart, D-70569, Germany
SO Angewandte Chemie, International Edition in English (***1996***), 35(4), 437-9
CODEN: ACIEAY; ISSN: 0570-0833
PB VCH
DT Journal
LA English
AB The authors overexpressed Manihot esculenta ***hydroxynitrile*** ***lyase*** (meHNL) in Escherichia coli. Enantioselective addn. of hydrocyanic acid to several aldehydes and ketones was by enzyme ***immobilized*** on nitrocellulose and using diisopropyl ether as solvent was demonstrated.

L5 ANSWER 11 OF 26 CAPLUS COPYRIGHT 2003 ACS
AN 1993:470564 CAPLUS
DN 119:70564
TI Manufacture of chiral cyanohydrins by resolution with oxynitrilase
IN Niedermayer, Uwe
PA Germany
SO Ger., 4 pp.
CODEN: GWXXAW
DT Patent
LA German
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
PI	DE 4139987	C1	19930415	DE 1991-4139987	19911204	<--
	WO 9311255	A1	19930610	WO 1992-DE1018	19921203	<--
	W: AU, CA, JP, US					
	RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE					
	AU 9340288	A1	19930628	AU 1993-40288	19921203	<--
	EP 576638	A1	19940105	EP 1992-924554	19921203	<--
	R: AT, BE, CH, DE, ES, FR, GB, LI, NL					
PRAI	DE 1991-4139987		19911204			
	WO 1992-DE1018		19921203			

AB Chiral cyanohydrins are prepd. in high yield and enantiomeric purity by digestion of racemic mixts. of cyanohydrins with (R)- or (***S***)- ***oxynitrilase*** . The HCN produced in this reaction is removed from the equil. mixt. by a carbonyl-contg. compd. such as formaldehyde or acetaldehyde, thereby promoting the reaction. Racemic mandelonitrile and acetaldehyde were incubated with ***immobilized*** (R)-oxynitrilase. (S)-madelonitrile of ee 93.8% was produced in 75% yield.

L5 ANSWER 12 OF 26 CAPLUS COPYRIGHT 2003 ACS
AN 1976:86148 CAPLUS
DN 84:86148
TI Binding of biologically active proteins to carriers
IN Jaworek, Dieter; Maier, Josef; Nelboeck-Hochstetter, Michael

PA Boehringer Mannheim G.m.b.H., Fed. Rep. Ger.
SO Ger. Offen., 25 pp.
CODEN: GWXXBX
DT Patent
LA German
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 2426988	A1	19760108	DE 1974-2426988	19740604 <--
	DE 2426988	C2	19850214		
	AT 7503391	A	19760915	AT 1975-3391	19750502 <--
	AT 336530	B	19770510		
	GB 1450519	A	19760922	GB 1975-22659	19750523 <--
	US 4038140	A	19770726	US 1975-582495	19750530 <--
	CH 621146	A	19810115	CH 1975-7038	19750530 <--
	NL 7506507	A	19751208	NL 1975-6507	19750602 <--
	FR 2273816	A1	19760102	FR 1975-17461	19750604 <--
	FR 2273816	B1	19790323		
	JP 51012891	A2	19760131	JP 1975-67421	19750604 <--
PRAI	DE 1974-2426988		19740604		

AB Enzymes were bound covalently to carriers by carrying out copolymn. of activated polysaccharide and hydrophilic monomer or copolymn. of a monomer mixt. (without polysaccharide) in the presence of enzyme. One of the monomers polymd. with polysaccharide was reacted with the enzyme directly and thus the enzyme would be covalently bound to carrier. Alternatively, a crosslinking agent coupled to the enzyme was used to link enzyme with a grafted copolymer (e.g. starch-acrylamide). Thus, acrylamide and starch allyl ether were dissolved in phosphate buffer. Then, a soln. of D-***hydroxynitrile*** ***lyase*** (from almonds) with which acrylic acid chloride had been reacted was added to the starch-acrylamide buffered soln. Next, the polymn. starter soln. contg. 5% ammonium peroxydisulfate and 5% 3-dimethylaminopropionitrile was added. After the polymerizate set for 3 hr, it was pressed through a sieve of mesh size 0.4 mm and eluted into a column with buffered 0.5M NaCl. Other enzymes bound by similar procedures were yeast hexokinase, swine pancreatic trypsin, and acylase I of swine kidney.

L5 ANSWER 18 OF 26 BIOTECHDS COPYRIGHT 2003 THOMSON DERWENT AND ISI
AN 1997-03392 BIOTECHDS
TI Enantioselective synthesis of aliphatic (S)-cyanohydrins in organic solvents using ***hydroxynitrile*** - ***lyase*** from Manihot esculenta;
cassava recombinant enzyme purification from Escherichia coli (conference paper)
AU Wajant H; Forster S; Sprauer A; Effenberger F; Pfizenmaier K
CS Univ.Stuttgart-Inst.Cell-Biol.Immunol.; Univ.Stuttgart-Inst.Org.Chem.Isotop.Res.
LO Institut fuer Zellbiologie und Immunologie, Universitaet Stuttgart, 70569 Stuttgart, Germany.
SO Ann.N.Y.Acad.Sci.; (***1996***) 799, 771-76
CODEN: ANYAA9 ISSN: 0077-8923
Enzyme Engineering XIII, San Diego, CA, 15-20 October, 1995.
DT Journal
LA English
AN 1997-03392 BIOTECHDS
AB The purification and expression cloning of acetone-cyanohydrin-lyase from cassava (Manihot esculenta Crantz) (MeHNL, EC-4.1.2.37) is described.

The MeHNL gene was cloned in the expression vector plasmid pQE3 to give plasmid pQE3-MeHNLwt, which was used to transform Escherichia coli M15(pREP4) cells for overexpression of MeHNL. Expression of MeHNL was induced by adding IPTG. Recombinant MeHNL was purified using Q-Sepharose column, gel filtration chromatography and anion-exchange chromatography. The specific activity of purified MeHNL was 86 U/mg, and a yield of 0.5 g soluble MeHNL (from an 80 l culture) was achieved (150 mg pure enzyme). The enzyme was purified 5.1-fold, with a yield of 54% and a specific activity of 86 U/mg. The enzyme was used for (S)-cyanohydrin production in diisopropyl ether, using HCN as the cyanide source. Use of a highly concentrated MeHNL preparation for ***immobilization*** increased activity 4- to 10-fold. (7 ref)

L5 ANSWER 19 OF 26 BIOTECHDS COPYRIGHT 2003 THOMSON DERWENT AND ISI
AN 1994-13130 BIOTECHDS
TI The potential of lyases in organic synthesis; e.g. aspartate-ammonia-lyase, L-aspartate-4-decarboxylase, fumarase and phenylalanine-ammonia-lyase application in the chemical and food industry (conference paper)
AU van den Tweel W J J; van der Werf M J; Hartmans S; Schoemaker H E; Kamphuis J; de Bont J A M
CS DSM-Res.; Univ.Wageningen-Agr.
LO Bio-organic Chemistry Section, DSM Research, P.O. Box 18, 6160 MD Geleen, The Netherlands.
SO Prog.Biotechnol.; (***1994***) 9, Pt.1, 455-62
CODEN: PBITE3
DT Journal
LA English
AN 1994-13130 BIOTECHDS
AB The following conversions using lyases were discussed: (1) production of L-aspartic acid from fumaric acid using ***immobilized*** Escherichia coli aspartate-ammonia-lyase (EC-4.3.1.1); (2) production of L-alanine and D-aspartic acid from L-aspartic acid using ***immobilized*** Pseudomonas dacunhae L-aspartate-4-decarboxylase in a packed column reactor; (3) production of L-malic acid from ***immobilized*** Brevibacterium flavum fumarate-hydratase (EC-4.2.1.2); (4) production of L-phenylalanine using Rhodotorula rubra phenylalanine-ammonia-lyase (EC-4.3.1.5); and (5) beta-hydroxylation of carboxylic acids. Examples of achievements in research and development include: (i) production of R- and S-cyanohydrins using R- and ***S*** - ***oxynitrilase*** ; (ii) acyloin formation mediated by benzoylformate-decarboxylase (EC-4.1.1.7); (iii) production of D-malic acid and D-citramalic acid from maleic acid and citraconic acid, respectively using Pseudomonas pseudoalcaligenes NCIMB 9867 malease; and (iv) carbon-carbon formation by transketolases (EC-2.2.1.1). (19 ref)

L5 ANSWER 20 OF 26 BIOTECHDS COPYRIGHT 2003 THOMSON DERWENT AND ISI
AN 1994-01125 BIOTECHDS
TI Enzyme-catalyzed C-C linkage using oxynitrilases and aldolases; (R)- and (***S***)- ***oxynitrilase*** , fructose-1,6-diphosphate-aldolase and 3-hexulose-6-phosphate-synthase (conference paper)
AU Kula M R; Albrecht J; Beisswenger R; Brockamp H P; Jansen I; Niedermeyer U
CS Univ.Heinrich-Heine-Duesseldorf.Inst.Enzymtechnol.
LO Heinrich-Heine-Universitaet Duesseldorf, Institut fuer Enzymtechnologie, Postfach 2050, D-5170 Juelich, Germany.

SO DECHEMA Monographies; (***1993***) 185-95
CODEN: 9999W
DT Journal
LA German
AN 1994-01125 BIOTECHDS
AB Oxynitrilases from 3 plant sources were purified to give final activities of 69-260 U/mg. During conversion of carbonyl compounds with HCN, the enzymes from almond (Prunus amygdalus) husk and flax (Linum usitatissimum) gave (R)-cyanohydrins whilst that from Sorghum bicolor yielded (S) enantiomers. Racemic products were also obtained under many reaction conditions, but if the pH was suitably adjusted, optical purity was significantly increased. (R)- and (***S***)- ***oxynitrilases*** ***immobilized*** on lyotropic liquid crystals gave 88% purity at pH 7 and 99% and pH 4.5. ***Immobilized*** (R)-oxynitrilase in a continuous fixed bed reactor produced D-mandelonitrile with 94-96% ee over 100 hr. The (S)-enzyme converted mostly benzaldehyde derivatives and the (R)-oxynitrilases had wider specificities. A fructose-1,6-diphosphate-aldolase (EC-4.1.2.13) isolated from Staphylococcus carnosus is a class I aldolase with a broad specificity for aldehydes as substrates and with good stability. 3-Hexulose-6-phosphate-synthase from Methylomonas sp. M 15 had stereoselectivity for aldol condensation with unnatural substrates including the production of octuloses. (32 ref)

L5 ANSWER 21 OF 26 BIOTECHDS COPYRIGHT 2003 THOMSON DERWENT AND ISI
AN 1992-09334 BIOTECHDS
TI Enzymatic syntheses of optically active (R)- and (S)-cyanohydrins in organic solvents;
stereospecific cyanohydrin production in an organic phase system using ***immobilized*** almond mandelonitrile-lyase or Sorghum bicolor hydroxymandelonitrile-lyase (conference paper)
AU Effenberger F; Foerster S; Hoersch B; Ziegler T
LO Institute of Organic Chemistry, University, Pfaffenwaldring 55, D-W 7000 Stuttgart 80, Germany.
SO Biochem.Eng.Stuttgart; (***1991***) 134-36
DT Journal
LA English
AN 1992-09334 BIOTECHDS
AB (R)-oxynitrilase (mandelonitrile-lyase, EC-4.1.2.10) from defatted bitter almond flour and (***S***)- ***oxynitrilase*** (hydroxymandelonitrile-lyase, EC-4.1.2.11) from Sorghum bicolor seedlings were used to catalyze asymmetric (R)- and (S)-cyanohydrin production, respectively, in an organic phase system. The enzymes were ***immobilized*** on Avicel cellulose. (S)-cyanohydrins were produced by suspension of ***immobilized*** (***S***)- ***oxynitrilase*** in 10 ml diisopropyl ether, addition of aldehyde (2 mmol) and HCN (300 ul, 7.5 mmol), and stirring until all of the aldehyde had reacted. With (R)-oxynitrilase, (R)-cyanohydrins of aromatic, aliphatic and heterocyclic aldehydes were obtained in 96-99% ee and excellent yield (71-90%). (***S***)- ***oxynitrilase*** showed a greater substrate specificity, accepting exclusively aromatic aldehydes as substrates, and had a slower reaction rate. (S)-cyanohydrins were obtained in 89-97% ee and 80-93% yield. (R)-and (S)-cyanohydrins are useful intermediates for synthesis of alpha-hydroxycarboxylic acids, 1-amino-2-alcohols and alpha-hydroxyaldehydes. (10 ref)

L5 ANSWER 22 OF 26 BIOTECHDS COPYRIGHT 2003 THOMSON DERWENT AND ISI

AN 1990-05832 BIOTECHDS
TI Enzyme-catalyzed synthesis of (S)-cyanohydrins and subsequent hydrolysis to (S)-alpha-hydroxy-carboxylic acids; stereospecific cyanohydrin production using ***immobilized*** hydroxymandelonitrile-lyase
AU Effenberger F; Hoersch B; Foerster S; Ziegler T
LO Institut fuer Organische Chemie, Universitaet Stuttgart, Pfaffenwaldring 55, D-7000 Stuttgart 80, Germany.
SO Tetrahedron Lett.; (***1990***) 31, 9, 1249-52
CODEN: TELEAY
DT Journal
LA English
AN 1990-05832 BIOTECHDS
AB (***S***)- ***Oxynitrilase*** (hydroxymandelonitrile-lyase, EC-4.1.2.11) was used to catalyze enantioselective addition of HCN to aldehydes yielding (S)-cyanohydrins in very high optical purity. High optical yields were only obtained if non-enzymatic addition, which resulted in racemic production, was successfully suppressed by working in organic solvents e.g. ethyl acetate or diisopropyl ether. Acid-catalyzed hydrolysis of optically active cyanohydrins afforded alpha-hydroxy carboxylic acids in optically active form. The enzyme-catalyzed reaction for production of (S)-cyanohydrins involved addition of a solution of hydroxymandelonitrile-lyase to a stirred suspension of Avicel-cellulose in 0.05 M phosphate buffer containing (NH4)2SO4. The mixture was stirred at RT for 10 min, filtered and the ***immobilized*** enzyme suspended in diisopropyl ether. After addition of aldehyde and HCN, the mixture was stirred until all of the aldehyde had reacted. The ***immobilized*** enzyme was removed and the filtrate was concentrated to yield (S)-cyanohydrin. In a typical reaction, 3-phenoxymandelonitrile (0.42 g) was obtained from 3-phenoxybenzaldehyde (0.40 g). (21 ref)

L5 ANSWER 23 OF 26 SCISEARCH COPYRIGHT 2003 THOMSON ISI
AN 1999:48339 SCISEARCH
GA The Genuine Article (R) Number: BM15C
TI Oxynitrilases: From cyanogenesis to asymmetric synthesis
AU Schmidt M (Reprint); Griengl H
CS GRAZ TECH UNIV, SPEZIALFORSCHUNGSBEREICH BIOKATALYSE, STREMAYRGASSE 16, A-8010 GRAZ, AUSTRIA (Reprint); GRAZ TECH UNIV, INST ORGAN CHEM, A-8010 GRAZ, AUSTRIA
CYA AUSTRIA
SO TOPICS IN CURRENT CHEMISTRY, (***OCT 1999***) Vol. 200, pp. 193-226.
Publisher: SPRINGER-VERLAG BERLIN, HEIDELBERGER PLATZ 3, W-1000 BERLIN 33, GERMANY.
ISSN: 0342-6793.
DT General Review; Journal
FS PHYS
LA English
REC Reference Count: 230
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS
AB Oxynitrilases are enzymes which catalyse the formation and cleavage of cyanohydrins. The cyanohydrin formation reaction proceeds by stereoselective addition of hydrogen cyanide to aldehydes or ketones to give enantiopure alpha-hydroxynitriles. This simple method of C-C bond formation has become a promising method to obtain a number of biologically active compounds. Cyanohydrin fission plays an important role in nature and is involved in plant defence where hydrogen cyanide is liberated upon plant damage. Among the known oxynitrilases only the (R)-oxynitrilase from

Prunus amygdalus and the (***S***)- ***oxynitrilases*** from Hevea brasiliensis and Manihot esculenta are available in sufficient quantities which allow cyanohydrin formation on a larger scale. Prunus amygdalus oxynitrilase can easily be isolated from natural sources (bitter almond bran) and for two (***S***)- ***oxynitrilases*** functional overexpression allows their production in sufficient amounts for broad preparative applications. The three dimensional structure of the (***S***)- ***oxynitrilase*** from Hevea brasiliensis has been determined, and suggestions concerning the reaction mechanism have been discussed. Several procedures employing oxynitrilases have been developed to date which enable cyanohydrin formation on a preparative scale, particularly the use of buffer solutions as the reaction medium, organic solvents with ***immobilised*** enzymes, as well as biphasic reaction systems. Possible follow up reactions of the generated hydroxy and nitrile functionality, as well as the conversion of unsaturated cyanohydrins into valuable asymmetric compounds are outlined.

L5 ANSWER 26 OF 26 WPIDS (C) 2003 THOMSON DERWENT
AN 1991-275467 [38] WPIDS
CR 1991-209314 [29]
DNC C1991-119359
TI Prepn. of optically active cyanohydrin derivs. - by enzymatic reaction of oxo cpds. with hydrocyanic acid using oxy nitrilase solubilised in liq. crystal.
DC B05 C02 C03 D16 E19
IN MIETHE, P; WANDREY, C; KRAGL, U; KULA, M R; STURTZ, I M; STUERTZ, I M
PA (KERJ) FORSCHUNGSZENT JUELICH GMBH; (UYHA-N) UNIV MARTIN LUTHER HALLE-WITTENBERG; (UYMA-N) MARTIN-LUTHER UNIV; (KERJ) FORSCHUNGSZENTRUM JUELICH GMBH
CYC 11
PI EP 446826 A 19910918 (199138)* <--
R: CH DE FR GB IT LI NL SE
DE 4008411 A 19910926 (199140) <--
DE 4028689 A 19920312 (199212) 6p <--
US 5122462 A 19920616 (199227) 7p <--
DE 4008411 C2 19930708 (199327) 5p <--
EP 446826 A3 19920715 (199334) <--
JP 06038793 A 19940215 (199411) 7p <--
EP 446826 B1 19951115 (199550) DE 10p <--
R: CH DE DK FR GB LI NL
DE 59106876 G 19951221 (199605) <--
ADT EP 446826 A EP 1991-103667 19910311; DE 4008411 A DE 1990-4008411 19900316; DE 4028689 A DE 1990-4028689 19900910; US 5122462 A US 1991-670437 19910318; DE 4008411 C2 DE 1990-4008411 19900316; EP 446826 A3 EP 1991-103667 19910311; JP 06038793 A JP 1991-51393 19910315; EP 446826 B1 EP 1991-103667 19910311; DE 59106876 G DE 1991-506876 19910311, EP 1991-103667 19910311
FDT DE 59106876 G Based on EP 446826
PRAI DE 1990-4028689 19900910; DE 1990-4008411 19900316; DE 1990-4008412 19900316
AN 1991-275467 [38] WPIDS
CR 1991-209314 [29]
AB EP 446826 A UPAB: 19951221
Prepn. of optically active cyanohydrin derivs. (I) comprises enzymatic reaction of oxo cpds. with hydrocyanic acid in an organic solvent in the presence of (R)- or (S)-oxy-nitrilasee (4.1.2.10) or (4.1.2.11) solubilised in a lyotropic liq. crystal. Reaction takes place under

acidic conditions and such that competing chemical reactions and racemisation are excluded. The surfactants used in the liq. crystal formation are not those whose hydrolysis would lead to an increase in pH.

USE/ADVANTAGE - (I) can be used in the prepn. of optically active alpha-aminoalcohols, alpha-hydroxycarboxylic acids, heterocycles and pyrethroid insecticides. (I) are easily derivated chiral building blocks which can be obtd. economically in sufficiently large amounts with the highest possible enantiomer excess(ee). The use of the lyotropic liq. crystal ensures that the reaction can be carried out under favourable conditions (esp. without the need to use low temps.) and with relatively low enzyme loss. @(9pp Dwg.No.0/2)

0/2

ABEQ US 5122462 A UPAB: 19930928

Prepn. of optically-active cyanohydrins (I) comprises solubilising (R)-oxynitrilase (4.1.2.10) or (***S***)- ***oxynitrilase*** (4.1.2.11) in a lyotropic liq. crystal, the oxynitrilase catalysing the prodn. of (I). An oxo cpd. is enzymatically reacted with hydrocyanic acid in an organic solvent in the presence of the solubilised oxynitrilase under conditions sufficiently acid for the competing chemical reaction and racemisation to be negligible.

Surfactants which produce an increase in pH upon hydrolysis are excluded from the liq. crystal formation. Pref. the reaction is carried out in a surfactant/organic solvent/liq. buffer system which has been prepd. using buffer solns. with pH values of 3-6.

USE - (I) are useful in the prodn. of optically-active alpha-amino alcohols, alpha-hydroxy carboxylic acids, heterocycles and pyrethroid insecticides.

ABEQ DE 4008411 C UPAB: 19931116

The flow reactor for heterogeneous conversion of fluids contg. substrate using lyotropic liq. crystals has a porous tube, filled with liq. crystals and a sealed end. The tube is contained in a sliding fit within a shrouding tube which forms the reactor mantle. The mantle forms a flow channel for the fluid flow, through a gap together with the pore vol. of the tube. The fluid enters through a feed distributor, and emerges through an upper outlet. the dia. of the inner tube is determined by the diffusion speed of the substrate at the biocatalyst, and is structured so that virtually all the liq. crystal layer is involved in the reaction.

USE/ADVANTAGE - Apps. uses the lyotropic liq. crystals to ***immobilise*** enzymes or microorganisms in organic solns. The assembly gives a high yield for usage time of the reactor vol. with no loss of activity in the reactor filling.

Dwg.0/2

ABEQ EP 446826 B UPAB: 19951215

Process for producing optically active cyanohydrins by enzymatic reaction of oxo compounds with hydrogen cyanide in the presence of (R)- or (***S***)- ***oxynitrilase*** (4.1.2.10) and (4.1.2.11) respectively under such acid conditions that the competing chemical reaction and racemisation are negligible, characterisd in that the reaction is carried out in an organic solvent in the presence of oxynitrilase solubilised in a lyotropic liquid crystal, excluding, in respect of the formation of the liquid crystal, those tensides and hydrolysis of which results in an increased pH.

Dwg.0/2

=> d cbib 13-17

L5 ANSWER 13 OF 26 IFIPAT COPYRIGHT 2003 IFI
3627298 ENZYMATIC PROCESSES FOR PREPARING (S)-CYANOHYDRINS; REACTION OF KETONE WITH CYANIDE TO FORM CYANOHYDRIN. Griengl Herfried (AT); Kirchner Gerald (DE); Schmidt Michael (AT); Werenka Christian (AT); Wirth Irma (AT). DSM Fine Chemicals Austria GmbH AT (49459).
US 6337196 8 Jan 2002.
PCT Pub. No. WO 9830711 16 Jul 1998. APPLICATION: US 1999-331761 25 Jun 1999.
PCT Appl. No. WO 1997-EP2692 26 May 1997. PCT 371 date 25 Jun 1999, PCT 102(e) date 25 Jun 1999.
PRIORITY: AT 1997-41 19970113.
TYPE OF PATENT: UTILITY. FILE SEGMENT: CHEMICAL; GRANTED.
No. of Claims: 9

L5 ANSWER 14 OF 26 IFIPAT COPYRIGHT 2003 IFI
3127080 METHOD OF PRODUCING (S)-CYANOHYDRINS; CATALYTIC CYANATION IN THE PRESENCE OF AN ***IMMOBILIZED*** OXYNITRILASE WITH NITROCELLULOSE CARRIER IN ORGANIC SOLVENT. Effenberger Franz (DE); Forster Siegfried (DE); Roos Jurgen (DE); Wajant Harald (DE). Degussa DE (23568).
US 5885809 23 Mar 1999.
APPLICATION: US 1997-796873 7 Feb 1997.
PRIORITY: DE 1996-19604715 19960209.
TYPE OF PATENT: UTILITY; REASSIGNED. DOCUMENT TYPE: CERTIFICATE OF CORRECTION. CORRECTION DATE: 9 Nov 1999. FILE SEGMENT: CHEMICAL; GRANTED.
No. of Claims: 9
MICROFILM REEL-FRAME NOS: 008554-0019.

L5 ANSWER 15 OF 26 IFIPAT COPYRIGHT 2003 IFI
2714660 ENANTIOMERIC ENRICHMENT OF CYANOHYDRINS; SELECTIVE DEHYDROCYANATION WITH OXYNITRILASE ENZYME. van Eikeren Paul. Bend Research Inc (10802).
US 35230 7 May 1996. US 5241087 31 Aug 1993 ORIGINAL PATENT.
APPLICATION: US 1994-192867 7 Feb 1994. US 1992-848023 9 Mar 1992 ORIGINAL APPLICATION.
TYPE OF PATENT: REISSUE. DOCUMENT TYPE: CERTIFICATE OF CORRECTION.
CORRECTION DATE: 15 May 2001. FILE SEGMENT: CHEMICAL; GRANTED.
No. of Claims: 19 Graphics Info: 5 Drawing Sheet(s), 5 Figure(s).

L5 ANSWER 16 OF 26 IFIPAT COPYRIGHT 2003 IFI
2393723 ENANTIOMERIC ENRICHMENT OF CYANOHYDRINS. van Eikeren Paul. Bend Research Inc (10802).
US 5241087 31 Aug 1993.
APPLICATION: US 1992-848023 9 Mar 1992.
TYPE OF PATENT: UTILITY; REISSUE REQUESTED. FILE SEGMENT: CHEMICAL; GRANTED. OTHER SOURCE: CA 120:8336.
No. of Claims: 19 Graphics Info: 5 Drawing Sheet(s), 5 Figure(s).
MICROFILM REEL-FRAME NOS: 006049-0896.

L5 ANSWER 17 OF 26 IFIPAT COPYRIGHT 2003 IFI
2262702 PROCESS FOR THE ENZYMATIC PREPARATION OF OPTICALLY-ACTIVE CYANOHYDRINS; REACTING OXO COMPOUND WITH HYDROCYANIC ACID IN PRESENCE OF OXYNITRILASE SOLUBILIZED IN LYOTROPIC LIQUID CRYSTAL UNDER ACID CONDITIONS. Kragl Udo (DE); Kula Maria-Regina (DE); Miethe Peter (DE); Stuertz Ingeborg M (DE); Wandrey Christian (DE). Forschungszentrum Julich GmbH DE (24899).
US 5122462 16 Jun 1992 (CITED IN 004 LATER PATENTS).
APPLICATION: US 1991-670437 18 Mar 1991.
PRIORITY: DE 1990-4008411 19900316; DE 1990-4008412 19900316; DE

1990-4028689 19900910.
TYPE OF PATENT: UTILITY; EXPIRED. FILE SEGMENT: CHEMICAL; GRANTED.
No. of Claims: 8 Graphics Info: 1 Drawing Sheet(s), 2 Figure(s).
MICROFILM REEL-FRAME NOS: 005713-0494.

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